

REMARKS

Applicants respectfully request reconsideration of the above-identified application in view of the following remarks.

Status of Claims

Claims 1, 5, and 6 are currently pending in the application and have been rejected.

Claim 1 has been amended herein. Applicants state that the amendments to the claims add no new matter.

CLAIM REJECTIONS

35 U.S.C. § 103 Rejections

In the final Office Action, the Examiner rejected Claims 1, 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Wachsman et al. (U.S. Patent Appl. Publ. No. 2003/066519) in view of Sullivan et al. (Analytical Chemistry, October 1999, 71(19), pp. 4369-4375) and Kudla et al. (Kudla et al., "Effect of Tungsten Oxide Addition on the Catalytic Activity of Gamma Al_2O_3 for NO_x Reduction From Fuel Lean Gas Mixtures." Ind. Eng. Chem. Res. 35 (1996): 4394-397.).

In the final Office Action, the Examiner also rejected Claims 1 and 5 under 35 U.S.C. § 103(a) as being unpatentable over Nagai et al. (Japanese Patent No. 6160344) in view of Sullivan et al. and Kudla et al.

In the final Office Action, the Examiner further rejected Claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Nagai et al. in view of Sullivan et al. and Kudla et al. and further in view of Wachsman et al.

In the Response to Final Office Action filed April 4, 2010, Applicants argued that Kudla et al. does not teach anything regarding electrocatalysts or electrolytes, as Kudla et al. teaches zeolite-like alumina catalysts whose acidity is increased by the presence of tungsten oxide. While the proton affinity of the internal surface of the zeolite-like material is taught to be modified with the tungsten oxide dopant, thereby improving the heterogeneous catalytic

behaviour, the system of Kudla et al. is not an electrolyte in any way, and indeed the bulk material (doped or not) is not even a conductor of ions or electrons.

Applicants further argued that the resulting catalysts taught by Kudla et al. are suitable for processing relatively large quantities of hot engine exhaust streams, which teaches away from the testing of a multiplicity of small samples of our invention. In addition, the tungsten oxide disclosed is present for modifying the acidity of the catalyst, and Kudla et al. does not use or lead towards the use of the electrochromic properties of tungsten oxide for indication.

In the Advisory Action, the Examiner responded that, while Kudla et al. is "simply used to teach the testing of catalysts" and "more specifically the effect of WO_3 as the catalyst," the same material is used in Wachsman et al. and Nagai, where it is of use as an electrocatalyst as the electrode itself. Therefore, the combination of Kudla et al. with either Wachsman et al. or Nagai et al. will teach the WO_3 material to be present and Kudla et al. teaches the testing of this electrocatalyst in the known combination.

The Examiner further stated that Kudla et al. is used only to show the testing of electrocatalytic material (WO_3) and their functionality, and Kudla et al. "is not used to teach the WO_3 material to be used as an electrochromic indicator, as it is only used to show that catalysts/electrocatalysts can be the analyte of the testing devices or sensors". Wachsman et al. or Nagai in combination with Sullivan teach the other aspects of the invention, including electrolyte materials, and the differentiation of Kudla et al. based on size of sample is irrelevant as an unclaimed limitation.

Applicants believe that herein lies a fundamental misunderstanding between the Examiner's understanding of the teaching of Kudla and of the present application.

Kudla et al. discloses some detailed effects of changing various parameters using the well-known acidic properties of WO_3 added to alumina for acid-catalyzed cracking of such things as hydrocarbons and oxides of nitrogen etc. However, the important point to stress is that in Kudla et al., WO_3 is an essential and integral component of the catalyst itself, albeit not an electrocatalyst. Applicants previously pointed out that Kudla et al. "does not make use of or lead towards the use of electrochromic properties of tungsten oxide for indication."

Applicants clarify that the claimed invention is not using WO_3 as the catalyst itself or indeed as a part of the catalysts themselves tested. The electrocatalysts of the claimed invention are the plurality of various materials in an array which are being tested for their electrocatalytic activity, such as "a battery electrode material (e.g., MnO_2) or a hydrogen storage alloy" (see paragraph [011] of the application), "an alloy containing one of the platinum group metals" (see paragraph [0037] of the application), or "platinum-containing catalytic electrodes of differing compositions placed on a conducting carbon substrate" (see paragraph [0044] of the application). Thus, the role of WO_3 in this application is not as the electrocatalyst or as any part of the electrocatalysts, but rather as an entirely separate indicator of the performance of the candidate electrocatalysts in the array. The WO_3 itself is an "electrochromic material forming part or all of the counter electrode which will change some property, preferably visual property, in response to the passage of current and in a manner proportional to the current passed." This function is not part of the actual catalyst system but is simply a separate quantitative "measuring tool" of the efficacy of the catalytic systems being evaluated.

Applicants also noted (see paragraph [0033] of the application) that, while WO_3 is a preferred electrochromic indicator material, others such as viologens, metal phthalocyanines, conducting polymers may be used, these compounds being used as indicators (like an ammeter) or measuring tools, not as the electrocatalysts themselves or as any integral part of the electrocatalysts being tested. The indicators are part of the test method not the materials being tested.

The color-change indicating property of WO_3 as an indicator is given in paragraph [0035] of the application, this reaction being WO_3 (blue) + $x(\text{Li}^+ + e^-) \rightarrow \text{Li}_x\text{WVI}(1-x)\text{WVxO}_3$ (very pale yellow), where the WO_3 is clearly a reactant in the indicator/measuring system and not a catalyst, and certainly not the catalysts of the array of materials being tested for their catalytic activity.

In addition, Applicants point out that Kudla et al. in fact relates to a $\gamma\text{-Al}_2\text{O}_3$ catalyst loaded with WO_3 (a $\text{WO}_3/\text{Al}_2\text{O}_3$ composite catalyst). The effect of WO_3 loading in the $\text{WO}_3/\text{Al}_2\text{O}_3$ composite catalyst was tested for its effect on catalytic activity for reducing NO and NO_x gases, by monitoring NO and NO_x conversions with an NO analyzer. It is, therefore,

clear that Kudla et al. does not teach (a) testing a catalyst for its electrocatalytic activity [instead, for reduction of NO/NO_x gases], (b) testing a catalyst using an electrochemical cell [instead, using a flow reactor with an NO analyzer], or (c) using WO₃ as an electrochromic indicator (as admitted by the Examiner) [instead, as a catalytic component of a composite catalyst]. It goes without saying that Kudla et al. cannot teach using an electrochromic material on a counter-electrode of an electrochemical cell, in view of (b) and (c) above.

The Examiner's final rejections of amended independent claim 1 are based upon Wachsmann et al. and Nagai as the primary references.

Applicants argue that Wachsmann discloses an electrochemical cell for measuring gas concentrations, comprising first and second (semiconductor) electrodes. The (semiconductor) materials are selected so as to undergo a change in resistivity or conductivity in response to contact with the gas component to be measured. The electrical signal generated by the cell is detected by a suitable detector that measures voltage or current.

The Examiner stated in paragraph 5 of the final Office Action that Wachsmann et al. discloses an electrode "having a tungsten oxide layer". Applicants assume that the Examiner was referring to the disclosures of WR3 (see paragraph [0014] of Wachsmann et al.) as an electrode (semiconductor) material. However, Wachsmann et al. does not teach (a) using the electrochemical cell to test an electrode material for its catalytic activity [instead, the cell is used to determine gas concentrations], or (b) using a counter-electrode bearing an electrochromic material. Elements (a) and (b) in Wachsmann et al. are not taught by Kudla et al.

Regarding shortcoming (a) in Wachsmann et al., even if Kudla et al. teaches the testing of catalysts and that catalysts can be the analyte of testing devices or sensors, Kudla et al. does not teach or suggest that the catalytic analyte should be on one of the electrodes of an electrochemical cell, as recited in amended independent claim 1. In any case, in order for the electrochemical cell of Wachsmann et al. to be available for use to test catalytic activity of one (the first) electrode (i.e., as required according to independent amended Claim 1), it would first be necessary to modify the teachings of Wachsmann et al. further, so as to remove the catalyst material from the other (=counter) electrode. As acknowledged by the Examiner in

the final Office Action (see bottom of page 2), there are two materials which function as catalysts present in Wachsman et al. One of these two catalysts (e.g., WR_3) is on the first electrode, and the other of the two catalysts (e.g., Au) would be on the second (=counter) electrode according to Figure 14, also paragraph [0093], of Wachsman et al.

Regarding shortcoming (b) in Wachsman et al., according to the Examiner's admission in the Advisory Action, "Kudla et al. is not used to teach the WO_3 material to be used as an electrochromic indicator, as it is only used to show that catalysts/electrocatalysts can be the analyte of the testing devices or sensors".

Therefore, the teachings in Kudla et al. cannot restore the shortcomings (a) and/or (b) in Wachsman et al.

Nagai et al., like Wachsman et al., relates to an electrochemical cell for measuring gas concentrations. Accordingly, the teachings in Nagai et al. are no more relevant than those of Wachsman et al. Both Nagai et al. and Wachsman et al. teach against the use of an electrochromic material as indicator, since both Nagai et al. and Wachsman et al. measure the electrical signal generated by the cell by means of a voltage or current detector electrically connected to the electrodes. Therefore, the teachings in Kudla et al. cannot restore the shortcomings of Nagai et al.

Sullivan et al. is relevant to the present invention (as acknowledged and discussed in the paragraph bridging pages 1 and 2 of the application), since it relates to testing of multiple materials for their electrocatalytic activity by a combinatorial strategy. However, Sullivan et al. does not teach or suggest using an electrochromic material as indicator on the counter-electrode, and would therefore not restore shortcoming (b) in Wachsman et al.

Thus, Wachsman et al., Sullivan et al., Kudla et al., and Nagai individually or collectively with any other reference do not teach or describe Applicants' invention.

Accordingly, Applicants respectfully assert that amended independent claim 1 is allowable. Claims 5 and 6 depend directly from amended independent claim 1, and therefore include all of its limitations. Therefore, Applicants respectfully assert that claims 5 and 6 are likewise allowable. Accordingly, Applicants respectfully request that the Examiner withdraw the rejections to amended independent claim 1 and to claims 5 and 6 dependent thereon.

APPLICANT(S): OWEN, John Robert et al.
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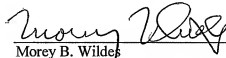
Conclusion

In view of the foregoing amendments and remarks, pending claims 1, 5, and 6 are allowable. Their favorable reconsideration and allowance is respectfully requested.

Should the Examiner have any questions or comments as to the form, content or entry of this Amendment, the Examiner is requested to contact the undersigned at the telephone number below. Similarly, if there are any further issues yet to be resolved to advance the prosecution of this application to issue, the Examiner is requested to telephone the undersigned counsel.

Other than the fees for a Petition for a Three-Month Extension of Time and a Request for Continued Examination that are being paid herewith, no fees are believed to be due associated with this paper. However, if any such additional fees are due, please charge such fees to deposit account No. 50-3355.

Respectfully submitted,



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